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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/501,128 | 10/14/2004 | Eivind Berg | 21649.26545 | 7879 |

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| EXAMINER | |
|---|---|
| HUGHES, SCOTT A | |
| **ART UNIT** | **PAPER NUMBER** |
| 3663 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|---|---|---|
| 3 MONTHS | 01/11/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/501,128 | BERG, EIVIND | |
| | Examiner | Art Unit | |
| | Scott A. Hughes | 3663 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *27 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *13,16-22,24,31 and 41-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13,16-22,24,31 and 41-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/27/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/27/2006 has been entered.

### *Response to Arguments*

Applicant's arguments filed 10/27/2006 have been considered but are not persuasive.

Applicant argues that the Sparrevik reference is not analogous art. Applicant argues that the Sparrevik reference is directed towards a device to generate shear waves while applicant's invention is directed toward sensing seismic energy at sensor nodes. This argument is not persuasive, as both the Sparrevik reference and the current application are directed to coupling devices to the ocean bottom for the purpose of a seismic survey. The Sparrevik reference teaches coupling a generator of seismic waves to the ocean bottom, while the claims are directed to a device which is coupled to the ocean bottom to sense the same type of seismic waves as are generated by the device in Sparrevik. Since both are directed to coupling devices to the ocean bottom so

that seismic waves are either generated or sensed in the ocean bottom, they are analogous art.

Applicant argues that modifying the Caldwell with the teaching of Sparrevik's skirt would destroy the intent and purpose of the Caldwell reference. Applicant argues that the Caldwell nodes are meant to be stabbed into the ocean bottom, while the skirt of Sparrevik uses a pumping system to embed it in the seabed. This argument is not persuasive, as the Sparrevik reference was cited as teaching that skirts that are used to couple seismic devices to the ocean bottom that have an open bottom allow for coupling to the ocean bottom. Using an open bottom skirt on Caldwell would not destroy the intent or purpose of Caldwell. An open bottom skirt would also be able to be stabbed into the ocean bottom. Further, it is noted that the Sparrevik reference was used to teach that skirts with an open bottom are used in ocean bottom seismic devices because the Caldwell reference does not specifically state that the skirt attached to the bottom of the disclosed sensor node is an open bottom skirt. However, from the description that the device is stabbed into the seafloor and use of the term skirt (skirt intends that the bottom is open), it can be supposed that the device of Caldwell has a skirt with an open bottom. The Sparrevik reference was used to show that skirts with an open bottom are used in ocean bottom seismic, and that Caldwell could use an open bottom skirt so that it can be better coupled to the ocean bottom than if the skirt were closed (a closed bottom would not allow for as good of coupling to the bottom since it would not allow for the device to be surrounded both inside an out by the earth of the seafloor).

With regard to claims 24 and 41, applicant's argument that there would be no advantage to burying the cable are not persuasive, as a buried cable would not move or pull the device due to ocean currents, and also would not snag or catch on objects on the ocean bottom. Applicant's arguments that the references do not teach the limitation of claim 41 of an outlet that receives a cable and discharges sediment are not persuasive as they are directed to functional language of the claim and not structural limitations of the apparatus claim. The "adapted to" clauses are essentially statements of intended use or method limitations, and do not further limit the structure of the claim. Further, the outlets of Vincent can both discharge sediment or receive a cable.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 13, 16, 18-20, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell in view of Sparrevik.

With regard to claim 13, Caldwell discloses a sensor arrangement for use in seismic investigation of geological formations below the seabed (Fig. 1) (Page 1274, Columns 1-2). Caldwell discloses a plurality of sensor nodes (Fig. 1), which are positioned for deployment on the seabed to acquire pressure waves and shear waves from the geological formations and to transfer seismic data to a surface receiver (Page

1274; 1278 – "Sensor system design and construction" to 1280, Column 2), wherein each sensor node comprises a substantially cylindrical skirt (Fig. 1) that is adapted to penetrate into the seabed and at least a first geophone that is connected to the skirt (1274; 1278 – "Sensor system design and construction" to 1280, Column 2). Caldwell discloses a sensor package containing geophones that is attached to a skirt. Caldwell does not specifically disclose that the bottom of the skirt is open. Caldwell discloses that the skirt is added to the base of the sensor package and that the skirt solves the problem of stability when the node is implanted into the seafloor (1280) (Fig. 1). Sparrevik teaches a cylindrical skirt that is used to penetrate the seafloor and to couple a seismic device to the seafloor (in this case a seismic wave generator, not sensors). Sparrevik teaches that the cylindrical skirt is open on the bottom (Figs. 1-13) (abstract; Pages 4-5). It would have been obvious to include the open bottom type skirt taught by Sparrevik as the skirt in the device of Caldwell in order to allow the skirt to penetrate downwards into the seabed and provide coupling with the ocean floor in which it is embedded.

With regard to claim 16, Caldwell discloses a housing that encloses the first geophone and is positioned at the top of the cylindrical structure (Fig. 1) (1278 – "Sensor system design and construction" to 1280, Column 2).

With regard to claim 18, Caldwell discloses a grip that is fixed to the top for use with a ROV ROT (1278 – "Sensor system design and construction" to 1280, Column 2).

With regard to claim 19, Caldwell discloses that the sensor node is connected to a control unit through an acoustic insulated cable (Fig. 1) (1278 – "Sensor system design and construction" to 1280, Column 2).

With regard to claim 20, Caldwell does not disclose what material is made out of, but from Fig. 1 the skirt appears to be metallic. Sparrevik teaches that the skirt used for penetrating the ocean bottom is a metallic skirt (Page 4). It would have been obvious to modify Caldwell to include a metallic skirt as taught by Sparrevik that is made out of aluminum as aluminum is a metal known to be used in seabed applications (See Donoho Column 6).

With regard to claim 31, Caldwell discloses a housing (sensor portion above skirt) (Fig. 1) that encloses at least one geophone, and that the geophone is positioned at the top of the cylindrical skirt to contact the surrounding sediments when the housing is lowered into the seabed (Fig. 1) (1274; 1278 – "Sensor system design and construction" to 1280, Column 2).

Claims 17 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell in view of Sparrevik as applied to claim 16 above, and further in view of Suarez.

With regard to claim 17, Caldwell discloses that the device includes a hydrophone in the housing, but does not disclose the location of the hydrophone (1274-1280). Suarez teaches that hydrophones in seabed nodes that include geophones and hydrophones are placed in the outer top part of the cylinder (open cage) (last Fig. on the

right of Fig. 2.3.3 – appears to match device of Fig. 1 in Caldwell) (Page 17, Last paragraph to Page 18). It would have been obvious to modify Caldwell to include the hydrophone in the outer top part of the cylinder as taught by Suarez in order to isolate the hydrophone for the obtaining of pressure signals.

With regard to claim 21, Caldwell does not disclose the exact location of the hydrophone. From Fig. 1 and the teaching of Suarez that the hydrophone is in the outer top part of the cylinder, it would be obvious that the separation between the geophones and hydrophone would be 10 cm based on the dimensions of the device as seen in the figure.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell in view of Sparrevik as applied to claim 16 above and further in view of Grant (3D*4C).

With regard to claim 22, Caldwell discloses that the housing encloses three geophones positioned at 90-degree angles in relation to each other (Page 1274, second column; 1278 – "Sensor system design and construction" to 1280, Column 2). Caldwell does not disclose the use of a tilt meter. Grant teaches the use of sensor nodes including geophones and a hydrophone on the seabed using a skirt to penetrate the seabed (Page 1). Grant teaches that the device also includes a tiltmeter (compass and inclinometers) (Page 1). It would have been obvious to modify Caldwell to include a tiltmeter as taught by Grant in order to measure the orientation of the unit on the seafloor.

Claims 24 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell in view of Sparrevik as applied to claim 19 above and further in view of Vincent.

With regard to claim 24, Caldwell discloses that the cable is received into the sensor node through an opening in the sensor housing, not through the skirt. Vincent teaches a device for deployment on the ocean bottom that includes sensors and a skirt designed for penetrating the bottom (Figs. 1-3). Vincent teaches that a cable 27 that transmits data from the device passes through an outlet in the upper part of the skirt 28 (Columns 3-4). It would have been obvious to modify Caldwell to include the cable passing through an opening in the skirt as taught by Vincent in order to be able to bury the cable under the seabed with the skirt.

With regard to claim 41, Vincent teaches that outlets in the skirt allow for sediment to be discharged when the sensor node is deployed (Column 4). It would have been obvious to modify Caldwell to include an outlet port that is adapted to discharge sediment in order to be able blow away the sediment below the sensor node to create a recess for the receipt of the skirt on the seabed.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell in view of Sparrevik, Vincent, and Suarez.

With regard to claim 42, Caldwell discloses a plurality of sensor nodes (Fig. 1) that are positioned for deployment on the seabed to acquire pressure waves and shear waves from the geological formations and to transfer seismic data to a surface receiver

(1278 and 1280). Sparrevik discloses that each sensor node comprises a substantially cylindrical skirt having a top and a bottom, the bottom being adapted to penetrate into the seabed (Fig. 1). Caldwell does not specifically disclose that the skirt bottom is open, but from the description that the skirt allows for the device to be stabbed into the seabed instead of having to dig a hole for the post it can be assumed that the skirt bottom is open. Sparrevik teaches a cylindrical skirt that is used to penetrate the seafloor and to couple a seismic device to the seafloor (in this case a seismic wave generator, not sensors). Sparrevik teaches that the cylindrical skirt is open on the bottom (Figs. 1-13) (abstract; Pages 4-5). It would have been obvious to include the open bottom type skirt taught by Sparrevik as the skirt in the device of Caldwell in order to allow the skirt to penetrate downwards into the seabed and provide coupling with the ocean floor in which it is embedded. Caldwell does not disclose that the skirt has a pair of outlets adapted to discharge sediment when the sensor node is deployed. Vincent teaches a skirt used with seismic seafloor devices that penetrate the seabed. Vincent teaches that outlets in the skirt allow for sediment to be discharged when the sensor node is deployed (Column 4). It would have been obvious to modify Caldwell to include an outlet port that is adapted to discharge sediment in order to be able blow away the sediment below the sensor node to create a recess for the receipt of the skirt on the seabed. Caldwell discloses a plate that is attached to the top of the skirt (Fig. 1) (1278 and 1280). Caldwell discloses a geophone housing (on top of skirt) for holding at least a first geophone, the geophone housing extending into the opening in the skirt and comprises an upper portion attached to the plate (Fig. 1). Caldwell discloses that the

device includes a hydrophone in the housing, but does not disclose the location of the hydrophone (1274-1280). Suarez teaches that hydrophones in seabed nodes that include geophones and hydrophones are placed in the outer top part of the cylinder (open cage) (last Fig. on the right of Fig. 2.3.3 – appears to match device of Fig. 1 in Caldwell) (Page 17, Last paragraph to Page 18). Suarez teaches that the cage is positioned above the plate and comprises a cover that attaches to the upper portion of the geophone housing, and a plurality of poles extending upward from the cover (Page 17, Last paragraph to Page 18) (Fig. 2.3.3). It would have been obvious to modify Caldwell to include the hydrophone in the outer top part of the cylinder as taught by Suarez in order to isolate the hydrophone for the obtaining of pressure signals. Caldwell and Suarez disclose that the sensor node of the figures comprises a grip that is adapted to be gripped by a gripping tool on an ROV, (which the disclose implants the device in the seabed) the grip attached to a plate that is attached to the tops of the poles (Fig. 1 in Caldwell; Fig. 2.3.3 in Suarez) (Caldwell Pages 1278-1280). Caldwell teaches an acoustic insulated cable having a first end adapted to be connected to an associated control unit and a second end operatively connected to the geophone housing (Fig. 1) (1274-1280). Caldwell discloses that the cable is received into the sensor node through an opening in the sensor housing, not through the skirt. Vincent teaches a device for deployment on the ocean bottom that includes sensors and a skirt designed for penetrating the bottom (Figs. 1-3). Vincent teaches that a cable 27 that transmits data from the device passes through an outlet in the upper part of the skirt 28 (Columns 3-4). It would have been obvious to modify Caldwell to include the cable

passing through an opening in the skirt as taught by Vincent in order to be able to bury the cable under the seabed with the skirt.

Claims 43-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell in view of Sparrevik, Vincent, and Suarez as applied to claim 42 above and further in view of Grant (3D*4C).

With regard to claim 43, Caldwell discloses that the housing encloses three geophones positioned at 90-degree angles in relation to each other (Page 1274, second column; 1278 – "Sensor system design and construction" to 1280, Column 2). Caldwell does not disclose the use of a tilt meter. Grant teaches the use of sensor nodes including geophones and a hydrophone on the seabed using a skirt to penetrate the seabed (Page 1). Grant teaches that the device also includes a tiltmeter (compass and inclinometers) (Page 1). It would have been obvious to modify Caldwell to include a tiltmeter as taught by Grant in order to measure the orientation of the unit on the seafloor.

With regard to claim 44, Caldwell discloses that the geophone housing comprises a coupling card (device to which the three geophones are mounted) (1274-1280).

With regard to claim 45, Caldwell discloses that the geophone housing further comprises an attachment plate that attaches to a cable connection of the cable (Fig. 1).

With regard to claim 46, Caldwell discloses that the geophone housing is substantially cylindrical and that the upper portion comprises a flange (Fig. 1).

With regard to claim 47, Caldwell does not disclose what material is made out of, but from Fig. 1 the skirt appears to be metallic. Sparrevik teaches that the skirt used for penetrating the ocean bottom is a metallic skirt (Page 4). It would have been obvious to modify Caldwell to include a metallic skirt as taught by Sparrevik that is made out of aluminum as aluminum is a metal known to be used in seabed applications (See Donoho Column 6).

With regard to claim 48, Caldwell does not disclose the exact location of the hydrophone. From Fig. 1 and the teaching of Suarez that the hydrophone is in the outer top part of the cylinder, it would be obvious that the separation between the geophones and hydrophone would be 10 cm based on the dimensions of the device as seen in the figure.

Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell in view of Sparrevik, Vincent, Grant and Suarez as applied to claim 43 above and further in view of Donoho.

With regard to claim 49, Caldwell does not teach teeth on the bottom of the skirt. Donoho teaches that it is known in the art of seabed seismic data acquisition devices to include teeth 157 (Fig .6) (Column 8) on the bottom of the device. It would have been obvious to modify Caldwell to include teeth as taught by Donoho in order to improve coupling with the seabed.

***Conclusion***

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAH

JACK KEITH
SUPERVISORY PATENT EXAMINER